



**THE DATASHEET OF
MMBTA06WT1G**



MMBTA06W, SMMBTA06W,

Driver Transistor

NPN Silicon

Features

- Moisture Sensitivity Level: 1
- ESD Rating:
 - ◆ Human Body Model – 4 kV
 - ◆ Machine Model – 400 V
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector–Emitter Voltage | V_{CEO} | 80 | Vdc |
| Collector–Base Voltage | V_{CBO} | 80 | Vdc |
| Emitter–Base Voltage | V_{EBO} | 4.0 | Vdc |
| Collector Current – Continuous | I_C | 500 | mAdc |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|-----------------|-------------|---------------------------|
| Total Device Dissipation FR–5 Board $T_A = 25^\circ\text{C}$ | P_D | 460 | mW |
| Thermal Resistance, Junction to Ambient (Note 1) | $R_{\theta JA}$ | 272 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature | T_J, T_{stg} | –55 to +150 | $^\circ\text{C}$ |

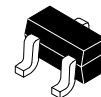
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR–4 Board, 1 oz. Cu, 100 mm².

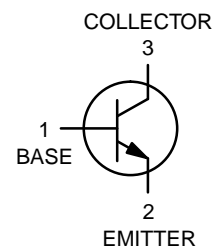


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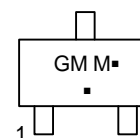
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SC–70
CASE 419
STYLE 3



MARKING DIAGRAM



GM = Specific Device Code
M = Date Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

| Device | Package | Shipping† |
|--------------|--------------------|-------------------------|
| MMBTA06WT1G | SC–70 (Pb–Free) | 3,000 / Tape & Reel |
| SMMBTA06WT1G | SC–70 (Pb–Free) | 3,000 / Tape & Reel |
| SMMBTA06WT3G | SC–70 (Pb–Free) | 10,000 / Tape & Reel |

For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

OFF CHARACTERISTICS

| | | | | |
|---|---------------|-----|-----|---------------|
| Collector–Emitter Breakdown Voltage (Note 1) ($I_C = 1.0\text{ mA}$, $I_B = 0$) | $V_{(BR)CEO}$ | 80 | – | Vdc |
| Emitter–Base Breakdown Voltage ($I_E = 100\ \mu\text{A}$, $I_C = 0$) | $V_{(BR)EBO}$ | 4.0 | – | Vdc |
| Collector Cutoff Current ($V_{CE} = 60\text{ Vdc}$, $I_B = 0$) | I_{CES} | – | 0.1 | μA |
| Collector Cutoff Current ($V_{CB} = 80\text{ Vdc}$, $I_E = 0$) | I_{CBO} | – | 0.1 | μA |

ON CHARACTERISTICS

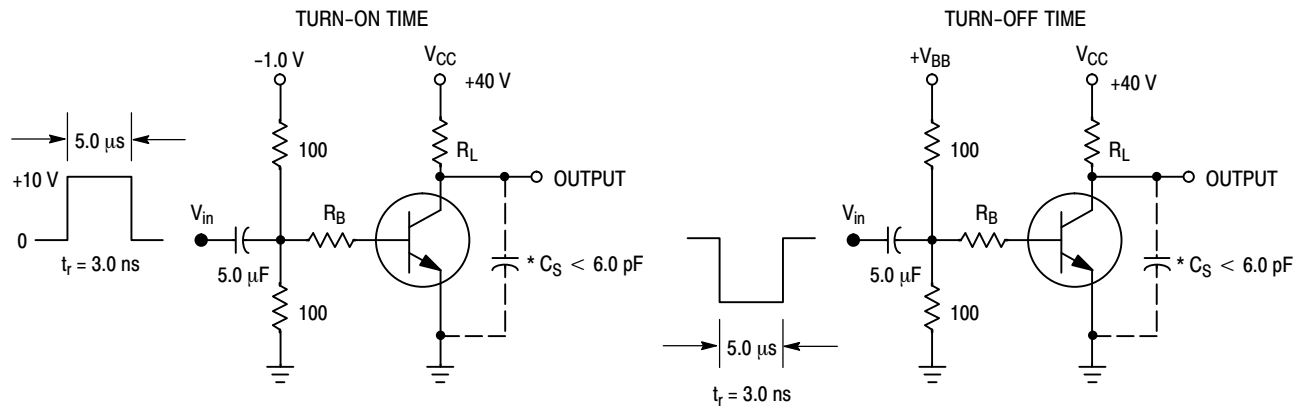
| | | | | |
|--|---------------|------------|--------|-----|
| DC Current Gain ($I_C = 10\text{ mA}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 100\text{ mA}$, $V_{CE} = 1.0\text{ Vdc}$) | h_{FE} | 100 100 | – – | – |
| Collector–Emitter Saturation Voltage ($I_C = 100\text{ mA}$, $I_B = 10\text{ mA}$) | $V_{CE(sat)}$ | – | 0.25 | Vdc |
| Base–Emitter On Voltage ($I_C = 100\text{ mA}$, $V_{CE} = 1.0\text{ Vdc}$) | $V_{BE(on)}$ | – | 1.2 | Vdc |

SMALL–SIGNAL CHARACTERISTICS

| | | | | |
|--|-------|-----|---|-----|
| Current–Gain – Bandwidth Product (Note 2) ($I_C = 10\text{ mA}$, $V_{CE} = 2.0\text{ V}$, $f = 100\text{ MHz}$) | f_T | 100 | – | MHz |
|--|-------|-----|---|-----|

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.
2. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.



*Total Shunt Capacitance of Test Jig and Connectors
For PNP Test Circuits, Reverse All Voltage Polarities

Figure 1. Switching Time Test Circuits

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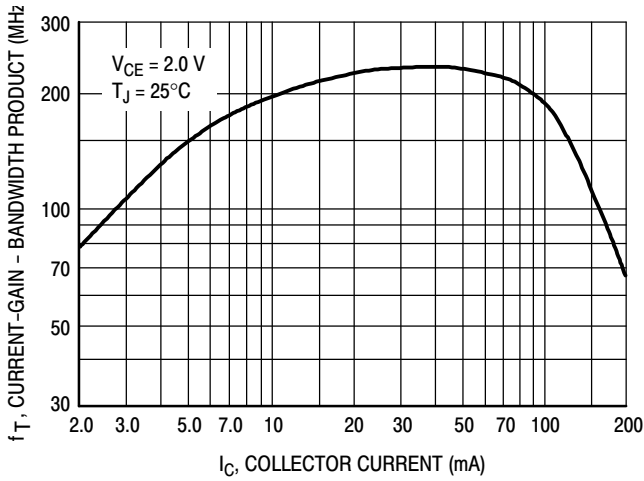


Figure 2. Current-Gain — Bandwidth Product

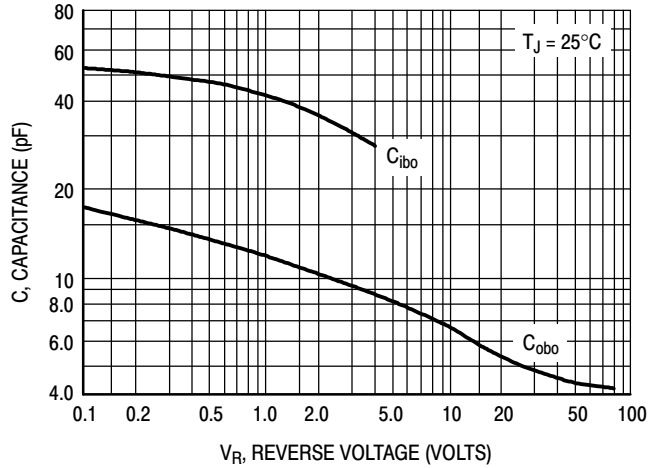


Figure 3. Capacitance

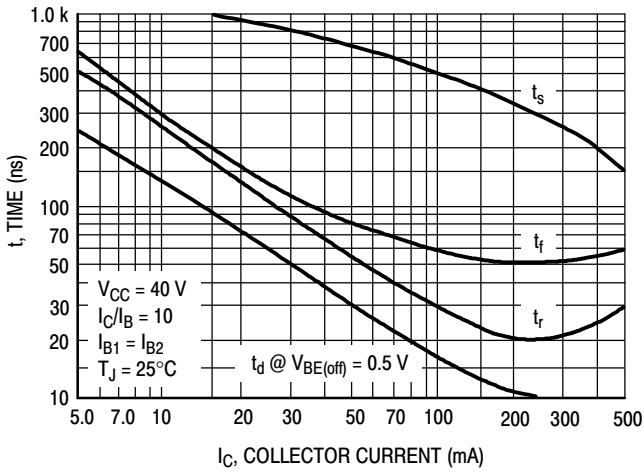


Figure 4. Switching Time

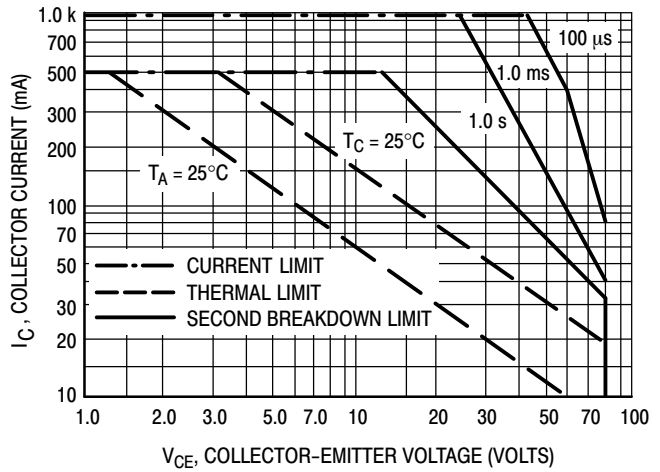


Figure 5. Active-Region Safe Operating Area

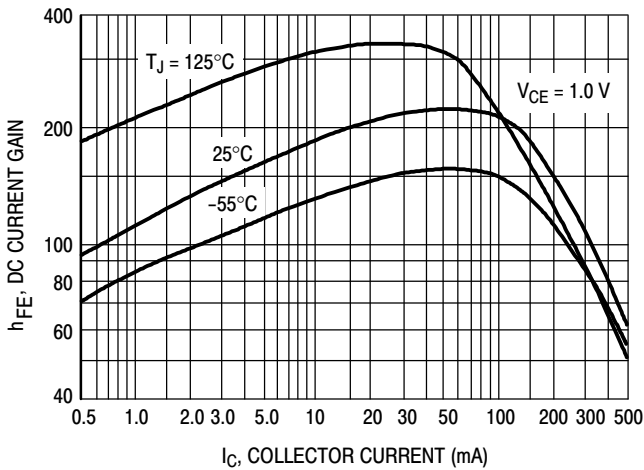


Figure 6. DC Current Gain

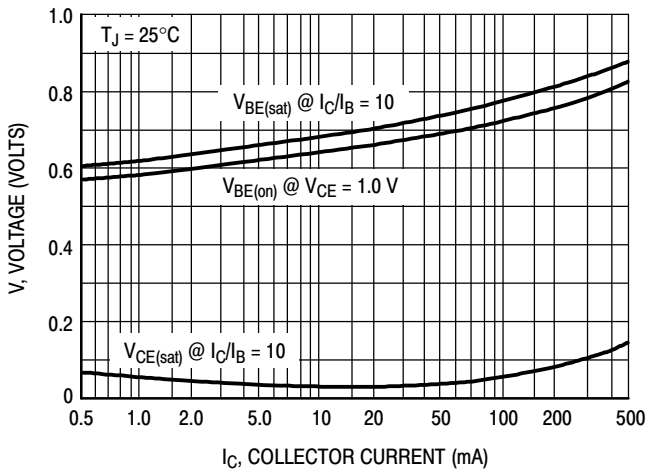


Figure 7. "ON" Voltages

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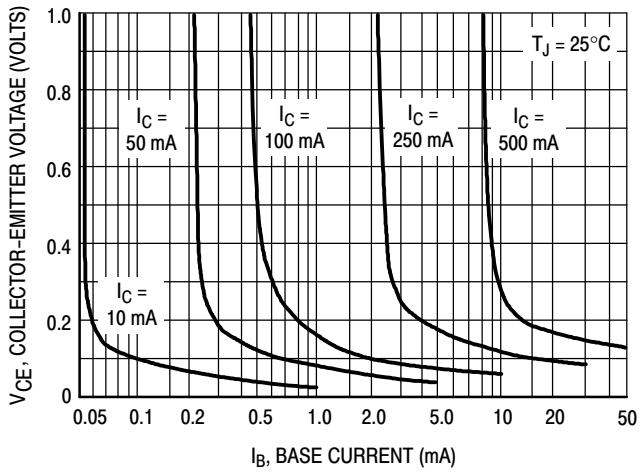


Figure 8. Collector Saturation Region

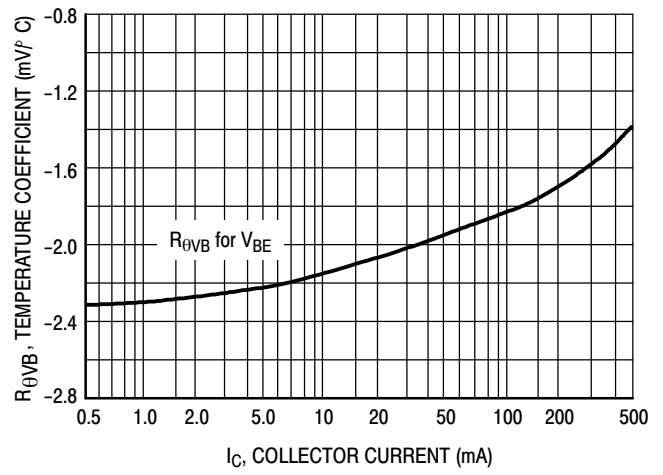
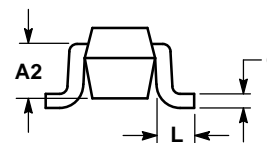
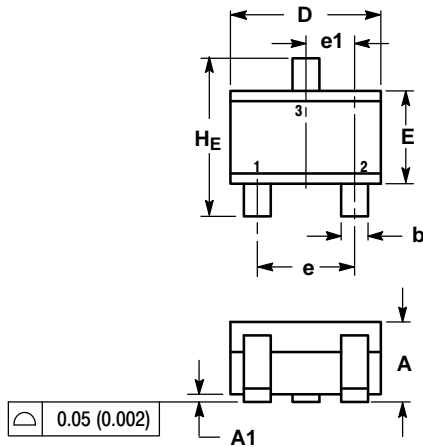


Figure 9. Base-Emitter Temperature Coefficient

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PACKAGE DIMENSIONS

SC-70 (SOT-323) CASE 419-04 ISSUE N

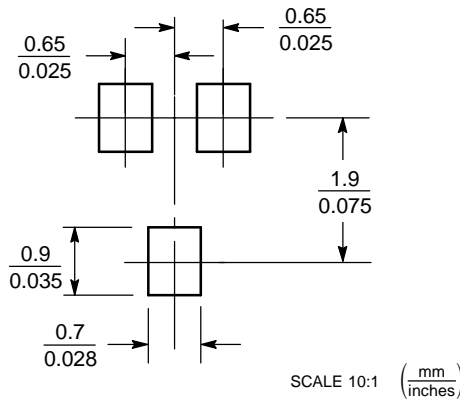


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|-----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.80 | 0.90 | 1.00 | 0.032 | 0.035 | 0.040 |
| A1 | 0.00 | 0.05 | 0.10 | 0.000 | 0.002 | 0.004 |
| A2 | 0.70 REF | | | 0.028 REF | | |
| b | 0.30 | 0.35 | 0.40 | 0.012 | 0.014 | 0.016 |
| c | 0.10 | 0.18 | 0.25 | 0.004 | 0.007 | 0.010 |
| D | 1.80 | 2.10 | 2.20 | 0.071 | 0.083 | 0.087 |
| E | 1.15 | 1.24 | 1.35 | 0.045 | 0.049 | 0.053 |
| e | 1.20 | 1.30 | 1.40 | 0.047 | 0.051 | 0.055 |
| e1 | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.20 | 0.38 | 0.56 | 0.008 | 0.015 | 0.022 |
| HE | 2.00 | 2.10 | 2.40 | 0.079 | 0.083 | 0.095 |

- STYLE 3:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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